

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-159450

(43)Date of publication of application : 23.06.1995

(51)Int.Cl.

G01R 15/24

G02B 6/00

G02F 1/03

G02F 1/09

(21)Application number : 05-304104

(71)Applicant : NGK INSULATORS LTD

(22)Date of filing : 03.12.1993

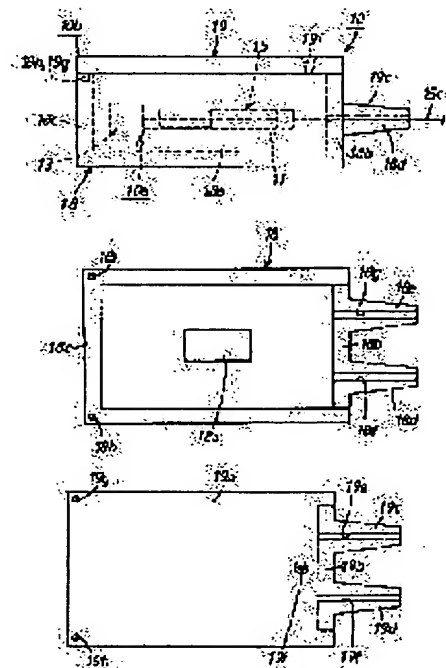
(72)Inventor : OKAJIMA HISAKAZU
YAMAMOTO MASANOBU

(54) PACKAGE STRUCTURE FOR OPTICAL SENSOR

(57)Abstract:

PURPOSE: To prevent each optical parts from being hit directly by impact force and, at the same time, to improve the peel strength at the joint of optical fibers in the package of an optical sensor.

CONSTITUTION: A housing 10b is composed of a box body 18 and lid body 19 and equipped with a placing section 18a on which a sensor substrate 11 is placed and fixed at nearly the center of the bottom section 18 of the box body 18 and a pair of bearing sections 18d and 18e which protrude from the vertical wall section 18b of the box body 18 and respectively bear optical fibers 15c and 16c from the bottom side. The lid body 19 is provided with a pair of bearing sections 19c and 19d which are respectively put on the sections 18d and 18e and bear the fibers 15c and 16c from the top side together with the sections 18d and 18e. After the substrate 11 is fixed on the placing section 18a, the lid body 19 is put on and fixed to the box body 18 so that impact force can be transmitted to each optical parts through the substrate 11 and the sticking lengths of the optical fibers can be made longer at each receiving and supporting section.



LEGAL STATUS

[Date of request for examination] 16.07.1999

[Date of sending the examiner's decision of rejection] 07.08.2001

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The collimator of the pair which has the rod lens joined to the end face of the ferrule which grasps an optical fiber, is arranged on a substrate, and forms an optical path, The optical element which was arranged by said substrate on this optical path and which has a polarizer, the Faraday effect, or the Pockels effect at least, And it is the structure of the package of the optical sensor which comes to contain the optical sensor equipped with the analyzer to a housing. While said housing consists of a box of the owner bottom which carries out opening to the upper part, and a lid which covers upper part opening of this box and equipping the pars basilaris ossis occipitalis of said box with the installation section smaller than this substrate with which said substrate is laid in the abbreviation center section It has the 1st ***** of the pair which **** the optical fiber which projects to the method of outside to the standing-up wall of this box, and extends from said collimator from a lower part. And it has the 2nd ***** of the pair which projects to the method of outside to said lid, is laid in said 1st *****, **** said optical fiber from the upper part, and grasps said optical fiber with said each 1st *****. While said substrate laid in the installation section of said box and has fixed Package structure of the optical sensor characterized by being grasped in said each 2nd ***** of said lid which each optical fiber which extends from said each collimator covered said each 1st ***** and this box, and fixed.

[Claim 2] Package structure of the optical sensor characterized by having the engagement section which engages with the plane of composition joined mutually [the box which constitutes said housing, and a lid] mutually, and fixes said box and lid to it.

[Claim 3] Package structure of the optical sensor characterized by equipping both box which constitutes said housing, and both [either or] with the through tube penetrated inside this housing.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the package structure of optical sensors, such as an optical field sensor using the Faraday effect and the Pockels effect, a photoelectrical community sensor, and an optical electrical-potential-difference sensor.

[0002]

[Description of the Prior Art] There is an optical sensor equipped with the collimator of the pair which has the rod lens joined to the end face of the ferrule which grasps an optical fiber, is arranged on a substrate, and forms an optical path, and the optical element which was arranged by said substrate on this optical path and which has a polarizer, the Faraday effect, or the Pockels effect at least and an analyzer as it considers as one format of an optical sensor and is shown in JP,1-244376,A.

[0003] As in carrying out a deer and using the optical sensor concerned it contains to a housing, and may be used as a package and it is shown in drawing 5 and drawing 6 as a conventional package, a means to use the substrate 6 which arranged each optics 1-5 also [box / by the side of a pars basilaris ossis occipitalis], to cover this box 6 with the lid 7 which counters this, and to fix these both 6 and 7 is taken. Moreover, the mutual plane of composition of a box 6 and a lid 7 was pasted, and the optical fibers 1a and 2a which extend from collimators 1 and 2 have extended outside.

[0004]

[Problem(s) to be Solved by the Invention] Thus, in the conventional package structure, since each optics 1-5 have fixed directly to the pars-basilaris-ossis-occipitalis side box 6 of a housing, when a housing is shocked, this impulse force will hit each optic directly, and will have big effect on these engine performance. Moreover, since the adhesion die length to the housing of optical fibers 1a and 2a is short, the optical fiber of an about [this jointing] tends to exfoliate, and there is a problem that vibratility-proof is low. Therefore, the purpose of this invention is in the package of an optical sensor to solve these problems.

[0005]

[Means for Solving the Problem] The collimator of the pair which this invention has the rod lens joined to the end face of the ferrule which grasps an optical fiber, is arranged on a substrate, and forms an optical path, The optical element which was arranged by said substrate on this optical path and which has a polarizer, the Faraday effect, or the Pockels effect at least, And it is the structure of the package of the optical sensor which comes to contain the optical sensor equipped with the analyzer to a housing. While said housing consists of a box of the owner bottom which carries out opening to the upper part, and a lid which covers upper part opening of this box and equipping the pars basilaris ossis occipitalis of said box with the installation section smaller than this substrate with which said substrate is laid in the abbreviation center section It has the 1st ***** of the pair which **** the optical fiber which projects to the method of outside to the standing-up wall of this box, and extends from said collimator from a lower part. And it has the 2nd ***** of the pair which projects to the method of outside to said lid, is laid in said each 1st ***** , **** said optical fiber from the upper part, and grasps said optical fiber

with said each 1st *****. While said substrate laid in the installation section of said box and has fixed, it is characterized by being grasped in said each 2nd ***** of said lid which each optical fiber which extends from said each collimator covered said each 1st ***** and this box, and fixed.

[0006] In the package structure concerning this invention, it is desirable to have the engagement section which engages with the plane of composition joined mutually [the box which constitutes said housing, and a lid] mutually, and fixes said box and lid to it. Moreover, in the package structure concerned, it is desirable to equip both box which constitutes a housing, and both [either or] with the through tube penetrated inside this housing.

[0007]

[Function and Effect of the Invention] In the package structure of this configuration, since the substrate which arranged each optic fixes in the installation section prepared in the pars basilaris ossis occipitalis of the box which constitutes a housing and is contained, the impulse force over a housing is transmitted through a substrate, hits each optic directly, and does not have big effect on those functions. Since especially the installation section is formed smaller than a substrate, its buffer function to the impulse force transmitted to a substrate from the installation section is large.

[0008] Moreover, since a means to grasp certainly at ***** which projects to the method of the outside established in the box and lid which constitute a housing is taken to the optical fiber which extends from a collimator, the die length the housing to an optical fiber carries out [die length] adhesion maintenance is long, the peel strength of this fiber is high, and vibratility-proof is high.

[0009] In addition, in the package structure concerning this invention, when it has the engagement section which engages with the plane of composition joined mutually [the box which constitutes said housing, and a lid] mutually, and fixes said box and lid to it, the bonding strength of both planes of composition is still higher, and shock resistance and vibratility-proof are much more good. Moreover, in the package structure concerned, when the through tube penetrated inside this housing is prepared in both box which constitutes a housing, and both [either or], the blowdown from the plane of composition of the air in the housing by the thermal expansion at the time of adopting thermosetting adhesive and pasting up a box and a lid can be prevented, and bonding strength of a plane of composition can be made equally high.

[0010]

[Example] The package 10 of the optical sensor which adopted the package structure concerning this invention for explaining one example of this invention based on a drawing below at drawing 1 is shown. The package 10 concerned comes to contain field sensor 10a which is an optical sensor to housing 10b. It is well-known in itself [field sensor 10a], and as shown in drawing 2, Faraday cell 12 has pasted the center section of the upper limit side of the substrate 11 of the quality of a ceramic, and the 1st and 2nd polarization beam splitter 13 and 14 has pasted the right-and-left both-sides section of the upper limit side of a substrate 11 on both sides of Faraday cell 12. These each part article 12-14 of each other is arranged in serial. Moreover, fitting is carried out to V slot established in each part of right and left on a substrate 11, and it pastes up, and the 1st and 2nd collimator 15 and 16 intersects perpendicularly, and is countered and arranged in each beam splitters 13 and 14.

[0011] Collimators 15 and 16 are constituted by the cylinder-like ferrules 15a and 16a, rod lenses 15b and 16b, and optical fibers 15c and 16c. Optical fibers 15c and 16c are inserted in the insertion hole prepared in the center section of Ferrules 15a and 16a, and the core wire has exposed them in the apical surface of Ferrules 15a and 16a. From Ferrules 15a and 16a, rod lenses 15b and 16b are the cylindrical things of a minor diameter a little, and are pasted up on the apical surface of Ferrules 15a and 16a in respect of the back end. The optical-axis adjustment which makes in agreement the axial center of optical fibers 15c and 16c and the optical axis of rod lenses 15b and 16b was made, and Ferrules 15a and 16a and rod lenses 15b and 16b have pasted up.

[0012] In the optical field sensor 10a concerned, incidence is carried out to Faraday cell 12, incidence of the light which carried out outgoing radiation from light source 17a being carried out to the 1st polarization beam splitter 13 which functions as a polarizer, incidence being carried out to rod-lens 15b through optical-fiber 15c of the 1st collimator 15, and being used as parallel light in rod-lens 15b, and

being used as the linearly polarized light. In Faraday cell 12, plane of polarization rotates according to the impressed field, and incidence of the incident light is carried out to the 2nd polarization beam splitter 14 which functions as an analyzer. Incidence of the incident light is carried out to rod-lens 16b of the 2nd collimator 16 as a modulation light of the reinforcement according to an impression field by the 2nd polarization beam splitter 14, it condenses, incidence is carried out to optical-fiber 16c, and outgoing radiation is carried out to light-receiving equipment 17b.

[0013] Housing 10b is constituted by the box 18 and lid 19 made of synthetic resin as shown in drawing 1. A box 18 is the thing of the owner bottom which carries out opening to the upper part, as shown in drawing 1 and drawing 3, and rectangle-like installation section 18a is formed in the abbreviation center section at the pars basilaris ossis occipitalis of a box 18. Field sensor 10a is formed in sufficient magnitude to be contained, and installation section 18a is formed for the box 18 very small as compared with the pars basilaris ossis occipitalis. Moreover, in the box 18, 18b is low formed in the standing-up wall of the back as compared with other standing-up wall 18c, and ***** 18d and 18e of the pair which carries out a predetermined die-length protrusion to back is formed in the crowning of standing-up wall 18b. The slots 18f and 18g into which optical fibers 15c and 16c fit are formed in the center section of the top face of each ***** 18d and 18e. Each standing-up walls 18b and 18c and the top face of each ***** 18d and 18e are formed in the plane, and are a plane of composition with the lid 19 mentioned later, and the engagement hollows 18h and 18i of a Uichi Hidari pair are formed on the plane of composition of standing-up wall 18c.

[0014] As a lid 19 is shown in drawing 1 and drawing 4, by consisting of covering device 19a, leg 19b, and ***** 19c and 19d of a pair, leg 19b fixed in the back end section of covering device 19a, and is caudad prolonged in predetermined length, and each ***** 19c and 19d were formed in the lower part of leg 19b in one, and are back prolonged in predetermined length. The slots 19e and 19f into which optical fibers 15c and 16c fit are formed in the center section of the each ***** [19c and 19d] inferior surface of tongue. In this lid 19, the engagement heights 19g and 19h of a Uichi Hidari pair are formed in the inferior surface of tongue of the front end section of covering device 19a, and conic through tube 19i is formed in the posterior part. The before [covering device 19a] side and the inferior-surface-of-tongue edge of right-and-left both sides are the plane of composition which is the plane of composition joined to the top face of standing-up wall 18c of a box 18, and the inferior surface of tongue of leg 19b and an each ***** [19c and 19d] inferior surface of tongue join to standing-up wall 18b of a box 18, and the top face of each ***** 18d and 18e. Therefore, in case a lid 19 covers upper part opening of a box 18 and is covered by fitting into a box 18 from the upper part, while it makes standing-up wall 18b face leg 19b, it is made to engage with the engagement hollows 18h and 18i which formed the engagement projections 19g and 19h formed in covering device 19a in the plane of composition of standing-up wall 18c of a lid 18.

[0015] In order to contain optical field sensor 10a in this housing 10b, it lays in a substrate 11 side at a before side by making each optics 12-14 installation section 18a in a box 18, point **** field sensor 10a is pasted up, and the optical fibers 15c and 16c which have extended from each collimators 15 and 16 are fitted into each slots 18f and 18g of each ***** 18d and 18e. Subsequently, where thermosetting adhesives are applied to each plane of composition of a box 18, a lid 19 is fitted in on a box 18, each engagement heights 19g and 19h are joined to each engagement hollows 18h and 18i, each ***** 19c and 19d are joined to each ***** 18e and 18f with engagement ****, and each optical FAIBA 15c and 16c is fitted into each slots 19e and 19f. Receipt of optical field sensor 10a is completed by carrying out heat curing of the adhesives to the last in this condition. in this condition, the lid 19 has fixed firmly to the box 18 -- each optical fibers 15c and 16c of both were grasped by vertical both ***** 18e and 19c and 18f and 19d, and have extended from the housing 20 to the exterior.

[0016] Thus, in the package 10 concerned, since the substrate 11 which arranged each optics 12-16 is fixed and contained to installation section 18a prepared in the pars basilaris ossis occipitalis of the box 18 which constitutes housing 10b, the impulse force over housing 10b is transmitted to each optics 12-16 through a substrate 11, hits each optics 12-16 directly, and does not have big effect on those functions. Since especially installation section 18a is formed smaller than a substrate 11, it buffers

greatly the impulse force over each optics 12-16. Moreover, each optical fibers 15c and 16c which extend from each collimators 15 and 16 are received. Since vertical both ***** 18e and 19c that project to the method of the outside established in the box 18 and lid 19 which constitute housing 10b, and 18f of means to grasp certainly in 19d are taken, the length to each optical fibers 15c and 16c which carries out adhesion maintenance can be lengthened, the peel strength of each optical fibers 15c and 16c can be raised, and vibratility-proof can be raised.

[0017] Since a means to form the engagement hollows 18h and 18i and the engagement heights 19g and 19h in the plane of composition which the box 18 which constitutes housing 10b, and a lid 19 join mutually in the package 10 concerned further again, and to fix a box 18 and a lid 19 by these engagement is taken, the bonding strength of both planes of composition is still higher, and shock resistance and vibratility-proof are much more good. Moreover, in the package 10 concerned, since through tube 19i is prepared in the lid 19 which constitutes housing 10b and the interior and the exterior of housing 10b are made to open for free passage, the blowdown from the plane of composition of the air in the housing 20 by the thermal expansion in the case of hardening of thermosetting adhesive can be prevented, and the bonding strength of a plane of composition can be held equally highly.

[0018] In addition, in this example, although the example which applied the package structure of this invention to the package which contained the optical field sensor was shown, the package structure of this invention can apply each optics 12-16 also to the package of various kinds of optical sensors which it comes to arrange on a substrate 11 in serial not to mention being applied to the package of a photoelectrical community sensor, and the package of an optical electrical-potential-difference sensor completely similarly.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the package structure of optical sensors, such as an optical field sensor using the Faraday effect and the Pockels effect, a photoelectrical community sensor, and an optical electrical-potential-difference sensor.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the package structure of optical sensors, such as an optical field sensor using the Faraday effect and the Pockels effect, a photoelectrical community sensor, and an optical electrical-potential-difference sensor.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the package structure of optical sensors, such as an optical field sensor using the Faraday effect and the Pockels effect, a photoelectrical community sensor, and an optical electrical-potential-difference sensor.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] There is an optical sensor equipped with the collimator of the pair which has the rod lens joined to the end face of the ferrule which grasps an optical fiber, is arranged on a substrate, and forms an optical path, and the optical element which was arranged by said substrate on this optical path and which has a polarizer, the Faraday effect, or the Pockels effect at least and an analyzer as it considers as one format of an optical sensor and is shown in JP,1-244376,A.

[0003] As in carrying out a deer and using the optical sensor concerned it contains to a housing, and may be used as a package and it is shown in drawing 5 and drawing 6 as a conventional package, a means to use the substrate 6 which arranged each optics 1-5 also [box / by the side of a pars basilaris ossis occipitalis], to cover this box 6 with the lid 7 which counters this, and to fix these both 6 and 7 is taken. Moreover, the mutual plane of composition of a box 6 and a lid 7 was pasted, and the optical fibers 1a and 2a which extend from collimators 1 and 2 have extended outside.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Function and Effect of the Invention] In the package structure of this configuration, since the substrate which arranged each optic fixes in the installation section prepared in the pars basilaris ossis occipitalis of the box which constitutes a housing and is contained, the impulse force over a housing is transmitted through a substrate, hits each optic directly, and does not have big effect on those functions. Since especially the installation section is formed smaller than a substrate, its buffer function to the impulse force transmitted to a substrate from the installation section is large.

[0008] Moreover, since a means to grasp certainly at ***** which projects to the method of the outside established in the box and lid which constitute a housing is taken to the optical fiber which extends from a collimator, the die length the housing to an optical fiber carries out [die length] adhesion maintenance is long, the peel strength of this fiber is high, and vibratility-proof is high.

[0009] In addition, in the package structure concerning this invention, when it has the engagement section which engages with the plane of composition joined mutually [the box which constitutes said housing, and a lid] mutually, and fixes said box and lid to it, the bonding strength of both planes of composition is still higher, and shock resistance and vibratility-proof are much more good. Moreover, in the package structure concerned, when the through tube penetrated inside this housing is prepared in both box which constitutes a housing, and both [either or], the blowdown from the plane of composition of the air in the housing by the thermal expansion at the time of adopting thermosetting adhesive and pasting up a box and a lid can be prevented, and bonding strength of a plane of composition can be made equally high.

[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Thus, in the conventional package structure, since each optics 1-5 have fixed directly to the pars-basilaris-ossis-occipitalis side box 6 of a housing, when a housing is shocked, this impulse force will hit each optic directly, and will have big effect on these engine performance. Moreover, since the adhesion die length to the housing of optical fibers 1a and 2a is short, the optical fiber of an about [this jointing] tends to exfoliate, and there is a problem that vibratility-proof is low. Therefore, the purpose of this invention is in the package of an optical sensor to solve these problems.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] This invention is the structure of the package of the optical sensor which comes to contain to a housing the optical sensor characterized by providing the following. While said housing consists of a box of the owner bottom which carries out opening to the upper part, and a lid which covers upper part opening of this box and equipping the pars basilaris ossis occipitalis of said box with the installation section smaller than this substrate with which said substrate is laid in the abbreviation center section It has the 1st ***** of the pair which **** the optical fiber which projects to the method of outside to the standing-up wall of this box, and extends from said collimator from a lower part. And it has the 2nd ***** of the pair which projects to the method of outside to said lid, is laid in said each 1st ***** , **** said optical fiber from the upper part, and grasps said optical fiber with said each 1st ***** . What is characterized by being grasped in said each 2nd ***** of said lid which each optical fiber which extends from said each collimator covered said each 1st ***** and this box, and fixed while said substrate laid in the installation section of said box and has fixed. The collimator of the pair which has the rod lens joined to the end face of the ferrule which grasps an optical fiber, is arranged on a substrate, and forms an optical path The optical element which was arranged by said substrate on this optical path and which has a polarizer, the Faraday effect, or the Pockels effect at least, and an analyzer

[0006] In the package structure concerning this invention, it is desirable to have the engagement section which engages with the plane of composition joined mutually [the box which constitutes said housing, and a lid] mutually, and fixes said box and lid to it. Moreover, in the package structure concerned, it is desirable to equip both box which constitutes a housing, and both [either or] with the through tube penetrated inside this housing.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] The package 10 of the optical sensor which adopted the package structure concerning this invention for explaining one example of this invention based on a drawing below at drawing 1 is shown. The package 10 concerned comes to contain field sensor 10a which is an optical sensor to housing 10b. It is well-known in itself [field sensor 10a], and as shown in drawing 2 , Faraday cell 12 has pasted the center section of the upper limit side of the substrate 11 of the quality of a ceramic, and the 1st and 2nd polarization beam splitter 13 and 14 has pasted the right-and-left both-sides section of the upper limit side of a substrate 11 on both sides of Faraday cell 12. These each part article 12-14 of each other is arranged in serial. Moreover, fitting is carried out to V slot established in each part of right and left on a substrate 11, and it pastes up, and the 1st and 2nd collimator 15 and 16 intersects perpendicularly, and is countered and arranged in each beam splitters 13 and 14.

[0011] Collimators 15 and 16 are constituted by the cylinder-like ferrules 15a and 16a, rod lenses 15b and 16b, and optical fibers 15c and 16c. Optical fibers 15c and 16c are inserted in the insertion hole prepared in the center section of Ferrules 15a and 16a, and the core wire has exposed them in the apical surface of Ferrules 15a and 16a. From Ferrules 15a and 16a, rod lenses 15b and 16b are the cylindrical things of a minor diameter a little, and are pasted up on the apical surface of Ferrules 15a and 16a in respect of the back end. The optical-axis adjustment which makes in agreement the axial center of optical fibers 15c and 16c and the optical axis of rod lenses 15b and 16b was made, and Ferrules 15a and 16a and rod lenses 15b and 16b have pasted up.

[0012] In the optical field sensor 10a concerned, incidence is carried out to Faraday cell 12, incidence of the light which carried out outgoing radiation from light source 17a being carried out to the 1st polarization beam splitter 13 which functions as a polarizer, incidence being carried out to rod-lens 15b through optical-fiber 15c of the 1st collimator 15, and being used as parallel light in rod-lens 15b, and being used as the linearly polarized light. In Faraday cell 12, plane of polarization rotates according to the impressed field, and incidence of the incident light is carried out to the 2nd polarization beam splitter 14 which functions as an analyzer. Incidence of the incident light is carried out to rod-lens 16b of the 2nd collimator 16 as a modulation light of the reinforcement according to an impression field by the 2nd polarization beam splitter 14, it condenses, incidence is carried out to optical-fiber 16c, and outgoing radiation is carried out to light-receiving equipment 17b.

[0013] Housing 10b is constituted by the box 18 and lid 19 made of synthetic resin as shown in drawing 1 . A box 18 is the thing of the owner bottom which carries out opening to the upper part, as shown in drawing 1 and drawing 3 , and rectangle-like installation section 18a is formed in the abbreviation center section at the pars basilaris ossis occipitalis of a box 18. Field sensor 10a is formed in sufficient magnitude to be contained, and installation section 18a is formed for the box 18 very small as compared with the pars basilaris ossis occipitalis. Moreover, in the box 18, 18b is low formed in the standing-up wall of the back as compared with other standing-up wall 18c, and ***** 18d and 18e of the pair which carries out a predetermined die-length protrusion to back is formed in the crowning of standing-up wall 18b. The slots 18f and 18g into which optical fibers 15c and 16c fit are formed in the center section of the top face of each ***** 18d and 18e. Each standing-up walls 18b and 18c and the top face

of each ***** 18d and 18e are formed in the plane, and are a plane of composition with the lid 19 mentioned later, and the engagement hollows 18h and 18i of a Uichi Hidari pair are formed on the plane of composition of standing-up wall 18c.

[0014] As a lid 19 is shown in drawing 1 and drawing 4, by consisting of covering device 19a, leg 19b, and ***** 19c and 19d of a pair, leg 19b fixed in the back end section of covering device 19a, and is caudad prolonged in predetermined length, and each ***** 19c and 19d were formed in the lower part of leg 19b in one, and are back prolonged in predetermined length. The slots 19e and 19f into which optical fibers 15c and 16c fit are formed in the center section of the each ***** [19c and 19d] inferior surface of tongue. In this lid 19, the engagement heights 19g and 19h of a Uichi Hidari pair are formed in the inferior surface of tongue of the front end section of covering device 19a, and conic through tube 19i is formed in the posterior part. The before [covering device 19a] side and the inferior-surface-of-tongue edge of right-and-left both sides are the plane of composition which is the plane of composition joined to the top face of standing-up wall 18c of a box 18, and the inferior surface of tongue of leg 19b and an each ***** [19c and 19d] inferior surface of tongue join to standing-up wall 18b of a box 18, and the top face of each ***** 18d and 18e. Therefore, in case a lid 19 covers upper part opening of a box 18 and is covered by fitting into a box 18 from the upper part, while it makes standing-up wall 18b face leg 19b, it is made to engage with the engagement hollows 18h and 18i which formed the engagement projections 19g and 19h formed in covering device 19a in the plane of composition of standing-up wall 18c of a lid 18.

[0015] In order to contain optical field sensor 10a in this housing 10b, it lays in a substrate 11 side at a before side by making each optics 12-14 installation section 18a in a box 18, point **** field sensor 10a is pasted up, and the optical fibers 15c and 16c which have extended from each collimators 15 and 16 are fitted into each slots 18f and 18g of each ***** 18d and 18e. Subsequently, where thermosetting adhesives are applied to each plane of composition of a box 18, a lid 19 is fitted in on a box 18, each engagement heights 19g and 19h are joined to each engagement hollows 18h and 18i, each ***** 19c and 19d are joined to each ***** 18e and 18f with engagement ****, and each optical FAIBA 15c and 16c is fitted into each slots 19e and 19f. Receipt of optical field sensor 10a is completed by carrying out heat curing of the adhesives to the last in this condition. in this condition, the lid 19 has fixed firmly to the box 18 -- each optical fibers 15c and 16c of both were grasped by vertical both ***** 18e and 19c and 18f and 19d, and have extended from the housing 20 to the exterior.

[0016] Thus, in the package 10 concerned, since the substrate 11 which arranged each optics 12-16 is fixed and contained to installation section 18a prepared in the pars basilaris ossis occipitalis of the box 18 which constitutes housing 10b, the impulse force over housing 10b is transmitted to each optics 12-16 through a substrate 11, hits each optics 12-16 directly, and does not have big effect on those functions. Since especially installation section 18a is formed smaller than a substrate 11, it buffers greatly the impulse force over each optics 12-16. Moreover, each optical fibers 15c and 16c which extend from each collimators 15 and 16 are received. Since vertical both ***** 18e and 19c that project to the method of the outside established in the box 18 and lid 19 which constitute housing 10b, and 18f of means to grasp certainly in 19d are taken, Die length to each optical fibers 15c and 16c which carries out adhesion maintenance can be lengthened, the peel strength of each optical fibers 15c and 16c can be raised, and vibratility-proof can be raised.

[0017] Since a means to form the engagement hollows 18h and 18i and the engagement heights 19g and 19h in the plane of composition which the box 18 which constitutes housing 10b, and a lid 19 join mutually in the package 10 concerned further again, and to fix a box 18 and a lid 19 by these engagement is taken, the bonding strength of both planes of composition is still higher, and shock resistance and vibratility-proof are much more good. Moreover, in the package 10 concerned, since through tube 19i is prepared in the lid 19 which constitutes housing 10b and the interior and the exterior of housing 10b are made to open for free passage, the blowdown from the plane of composition of the air in the housing 20 by the thermal expansion in the case of hardening of thermosetting adhesive can be prevented, and the bonding strength of a plane of composition can be held equally highly.

[0018] In addition, in this example, although the example which applied the package structure of this

invention to the package which contained the optical field sensor was shown, the package structure of this invention can apply each optics 12-16 also to the package of various kinds of optical sensors which it comes to arrange on a substrate 11 in serial not to mention being applied to the package of a photoelectrical community sensor, and the package of an optical electrical-potential-difference sensor completely similarly.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation showing the package of the optical field sensor constituted by adopting the package structure of this invention.

[Drawing 2] It is the top view of the optical field sensor adopted as this package.

[Drawing 3] It is the side elevation (a) and this top view (b) of the box which constitutes the housing adopted as this package.

[Drawing 4] It is the side elevation (a) and this bottom view (b) of the lid which constitutes this housing.

[Drawing 5] It is the side elevation showing the package of the optical field sensor constituted by adopting the conventional package structure.

[Drawing 6] It is the top view of the optical field sensor adopted as this package.

[Description of Notations]

10 [-- A substrate, 12 / -- 13 A Faraday cell, 14 / -- 15 A polarization beam splitter, 16 / -- A collimator, 15c, 16c / -- Optical FAIBA, 18 / -- A box, 18a / -- The installation section, 18d, 18e / -- *****, 19 / -- A lid, 19a / -- A covering device, 19c 19d / -- *****.] -- A package, 10a -- An optical field sensor, 10b -- A housing, 11

[Translation done.]

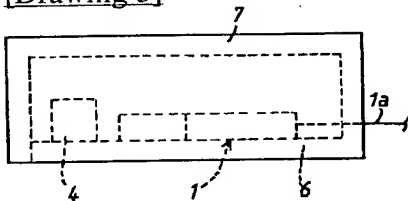
* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

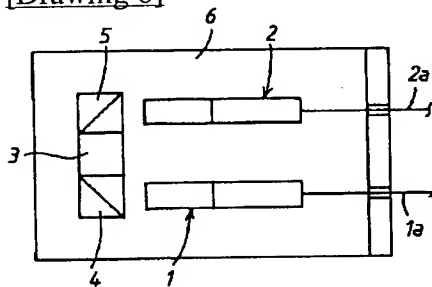
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

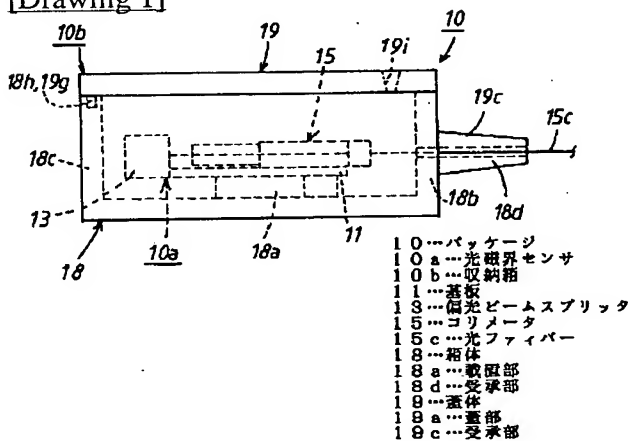
[Drawing 5]



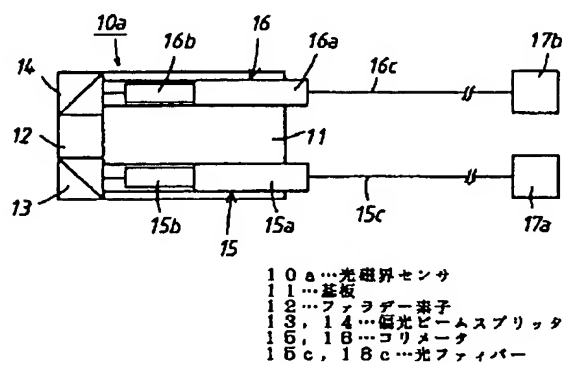
[Drawing 6]



[Drawing 1]

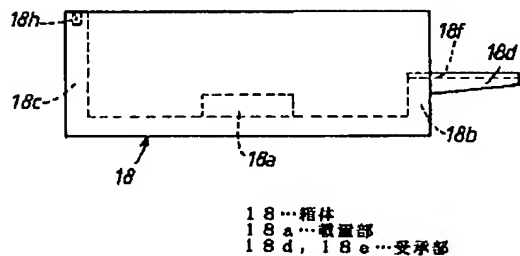


[Drawing 2]

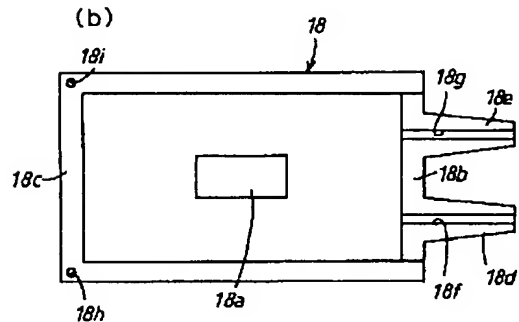


[Drawing 3]

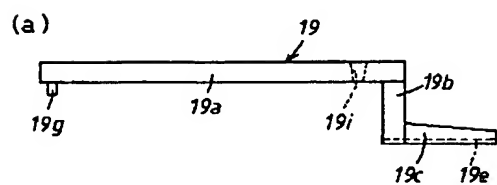
(a)



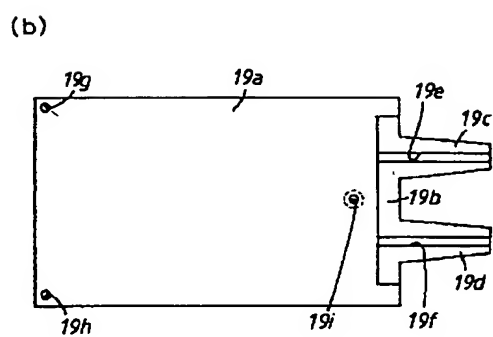
(b)



[Drawing 4]



19...本体
19a...蓋部
19c, 19d...受承部



[Translation done.]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
 [Section partition] The 1st partition of the 6th section
 [Publication date] December 15, Heisei 12 (2000. 12.15)

[Publication No.] JP,7-159450,A
 [Date of Publication] June 23, Heisei 7 (1995. 6.23)
 [Annual volume number] Open patent official report 7-1595
 [Application number] Japanese Patent Application No. 5-304104
 [The 7th edition of International Patent Classification]

G01R 15/24
 G02B 6/00
 G02F 1/03 505
 1/09 505

[FI]

G01R 15/07 B
 G02F 1/03 505
 1/09 505
 G01R 15/07 C
 G02B 6/00 B

[Procedure revision]
 [Filing Date] July 16, Heisei 11 (1999. 7.16)
 [Procedure amendment 1]
 [Document to be Amended] Specification
 [Item(s) to be Amended] Claim 2
 [Method of Amendment] Modification
 [Proposed Amendment]
 [Claim 2] Package structure of the optical sensor characterized by having the engagement section which engages with the plane of composition joined in the package structure of an optical sensor according to claim 1 mutually [the box which constitutes said housing, and a lid] mutually, and fixes said box and lid to it.
 [Procedure amendment 2]
 [Document to be Amended] Specification
 [Item(s) to be Amended] Claim 3
 [Method of Amendment] Modification
 [Proposed Amendment]
 [Claim 3] Package structure of the optical sensor characterized by having the through tube penetrated

inside this housing to both box which constitutes said housing, and both [either or] in the package structure of an optical sensor according to claim 1 or 2.

[Translation done.]

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.